

## 6. MVCIMP IMS OPTIONS

### 6.1 Introduction

This section of the report identifies and analyzes the options available for an MVCIMP IMS. Three options are outlined, including:

- a Centralized Hub;
- a Regional Hub; and
- a Split Hub.

The analysis of each option along the criteria contained in the SOW (and outlined previously in Section 3.5) is included in Section 6.5; identification of a preferred option is included in Section 6.6.

Additionally, it must be strongly emphasized that all of the options identified and analyzed on the following pages must address the challenges raised by the survey results (Section 4.2) in order for the IMS to succeed. Specifically, this includes overcoming:

- the lack of metadata associated with CIM information;
- the current low capacity of the potential nodes to share their CIM information;
- most of the CIM information at the nodes is not currently Internet ready;
- the need for additional resources at the node level; and
- systemic/structural issues (such as data sharing concerns).

Failure to address these issues will doom the IMS to failure.

#### 6.1.1 IMS Structure

The Working Group specified that this study was to concentrate solely on IMS options based on a decentralized, “virtual” structure. The primary function of the IMS would be to share monitoring metadata, which would include information about how to obtain actual data from authoritative sources, but not to distribute that data directly. In the hub/node model specified by the Working Group, the hub would gather and maintain monitoring metadata provided by nodes, which are authoritative (primary) sources of monitoring data. The hub would then provide end-users with access to the compiled metadata.

## 6.1.2 Definitions

### Node

Nodes are defined in the Scope of Work as authoritative sources of monitoring data. The main roles of each node within the IMS will be to:

- provide metadata to the system so that IMS users can identify monitoring data sources and evaluate whether they are suitable for a particular purpose
- accommodate requests for actual monitoring data by delivering monitoring data to end-users where deemed appropriate

### Hub

The hub will be a group or organization charged with the responsibility of compiling metadata on a continual basis and designing and maintaining a means of providing access to that metadata for a wide variety of end-users. The hub will suggest standards for data and metadata to the nodes, although conformance with any suggested standards will be at the discretion of each node. The hub will not be responsible for negotiating data sharing agreements, since that responsibility must rest with each node, who will be in the best position to decide how and when data should be shared.

### End User

An end user of the IMS will be anyone interested in obtaining information about monitoring data and/or how to access that data. The delivery of information within the IMS will attempt to accommodate varying levels of capacity (e.g. lack of internet access) but a certain level of technical sufficiency (i.e. relating to monitoring and technology) must be assumed. Adapting the IMS beyond that assumed level will be part of the Communication component of the IMS, which is being developed as a separate project.

### Capacity

#### Node Capacity

Each node must have the capacity to compile its own metadata related to its own monitoring data collection, and be able to transmit that metadata to the hub. Generally speaking, there should be a direct relationship between level of monitoring activity and existing IMS capacity. Low levels of monitoring activity (e.g. annual harvest study) will require low capacity. High levels of monitoring activity (e.g. Environment Canada) will require high capacity. In both cases the required capacity is likely already the same as existing capacity. The only time additional capacity will be required is where there is a gap between existing monitoring capacity and required IMS capacity.

#### Hub Capacity

The hub must be able to compile metadata on a continual basis, and have the ability to design and maintain a means of providing access to that metadata. The hub must also be able to identify new potential nodes and liaise with these groups as needed.

### 6.1.3 Technical Options

#### Implementation

The four functions of the hub are to:

- liaise with each node, and suggest standards for data and metadata formats;
- collect metadata from each node on an ongoing basis and enter that metadata into a relational database;
- provide public access to the metadatabase through a web interface; and
- provide web-hosting of the IMS website

Implementation will require:

- hiring one IMS Manager;
- initiating contact with each node to establish relationship for liaison;
- establish data and metadata standards;
- hiring one IMS Technician, who will either complete or contract out:
  - database design, including links to web interface;
  - website and interface design;
  - setup of web hosting service.

The database and website design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of between \$50,000 - \$75,000.

The hub will be responsible for creation of a metadatabase using commercial, off-the-shelf relational database, such as Microsoft Access. The database structure will be closely based on existing metadata standards. A web-based front end, or user interface, will be designed and linked to the metadatabase. The database and web interface will be hosted on a web server. Each node will be asked to conduct an inventory of all monitoring data, and to fill out online metadata input forms. Any nodes without internet access will be asked to fill out the submission form on removable media, such as a Zip disk or rewritable CD-ROM.

#### Maintenance

Ongoing maintenance will require:

- Staff support (financial and infrastructure, e.g. office space, computer, etc.);
- an IMS Manager;
- an IMS Technician; and

- a Web server with adequate bandwidth

The Hub will maintain one database that contains metadata that conforms to a known metadata standard, such as the FGDC standard. This metadatabase will be maintained in a commercial, off-the-shelf relational database, such as Microsoft Access. A web-based front end, or user interface, will be maintained and updated periodically. This database will have an online, password protected data entry form, where an appointed person from each node can access, enter, and update their own metadata. This would then be submitted to the hub, which would then perform QA/QC on the submission before approving its entry into the IMS metadatabase.

### 6.1.4 Organizational Options

All three of the following options are based on different structural configurations of the Hub. The configuration of the nodes is the same in all three options, since their role and responsibilities will be the same regardless. The options address the four hub functions, which can either be performed by one group or organization (centralized hub; regional hub), or by two organizations in different geographic locations (split hub). The differences in the three models reflect different levels of emphasis on capacity-building, cost, and the timelines estimated for development and implementation..

## 6.2 Option 1: Centralized Hub

### 6.2.1 Description

All four hub functions are performed by one organization, such as one of the Government of Canada departments or the territorial environmental boards (see Section 4.2.1.2), located in Yellowknife (see Section 4.2.1.1). This model provides the lowest potential for capacity building, but requires the least amount of time and resources. The two positions are created and filled during implementation. The database and web site design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of between \$50,000 - \$75,000. Web hosting could be provided in house or contracted out at a minimal cost.

### 6.2.2 Cost of Development and Implementation

IMS Manager:	\$70,000/year
IMS Technician:	\$55,000/year
Office support:	\$40,000/year

Costs are based on best estimates of the Project Team members, as well as with comparisons of costs associated with the development of other Hub models considered by the survey (see Section 4.1.4).

**Note:** this cost does not include the costs associated with database and website design (which could be either completed in house over a period of approximately 6 months) or contracted out (at a cost of between \$50,000 - \$75,000.) The 6-months or \$50,000-\$75,000 would have to be added to the cost depending on the route taken.

### 6.2.3 Time for Implementation

Staff hiring and start-up:	6 months
Database and web design:	6 months (concurrent)
<u>Initial compilation of metadata:</u>	<u>1 year</u>
Total time:	1.5 years

Time for implementation is based on best estimates of the Project Team members, as well as with comparisons of timelines associated with the development of other Hub models considered by the survey (see Section 4.1.4).

### 6.2.4 Potential to Build Capacity

This option has a low potential to build community capacity, since it is based on the strategy of leveraging as much existing capacity as possible within the existing organizations. It is also assumed that the capacity to fill the two required positions probably currently exists within the Yellowknife IT community (so no new capacity would be needed).

### 6.2.5 Information Access

The Scope of Work stated the requirement to address the “ability to provide information to users without internet access and meet the communications needs of communities”. The IMS will be an internet-based system. A static version of the IMS metadatabase will be published on suitable removable media, such as a Zip disk or CD-ROM on a quarterly basis. A hardcopy version will not be produced.

### 6.2.6 Ability to Provide Territorial-level Information

As with all options presented, this ability will be limited by the metadata provided by the nodes.

### 6.2.7 Roles, Responsibilities, Support Structure and Service Expectations

As mentioned above. It should be noted that the hub is a separate entity from the Working Group and the Responsible Authority, and that the hub’s responsibilities are limited to performing the four functions stated earlier.

## 6.3 Option 2: Regional Hub

### 6.3.1 Description

All four hub functions are performed by one organization, such as one of the co-management boards (see Section 4.2.1.2), located in Inuvik (see Section 4.2.1.1). This model provides a high potential for capacity building, but also requires the most time and resources. The two positions are created and filled during implementation. The database and web site design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of

between \$50,000 - \$75,000. Web hosting could be provided in house or contracted out at a minimal cost.

### 6.3.2 Cost of Development and Implementation

IMS Manager:	\$75,000/year
IMS Technician:	\$60,000/year
Office support:	\$50,000/year

It is assumed the costs for staff and office support are slightly higher in Inuvik than for Yellowknife. Costs are based on the research and best estimates of the Project Team members, as well as with comparisons of costs associated with the development of other Hub models considered by the survey (see Section 4.1.4).

**Note:** this cost does not include the costs associated with database and website design (which could be either completed in house over a period of approximately 6 months) or contracted out (at a cost of between \$50,000 - \$75,000.) The 6-months or \$50,000-\$75,000 would have to be added to the cost depending on the route taken.

### 6.3.3 Time for Implementation

Staff hiring and start-up:	1 year
IMS Technician training:	6 months
Database and web design:	6 months (concurrent)
<u>Initial compilation of metadata:</u>	<u>1 year</u>
Total time:	2.5 years

Time for implementation is based on best estimates of the Project Team members, as well as with comparisons of timelines associated with the development of other Hub models considered by the survey (see Section 4.1.4). It is assumed that the time for implementation is slightly longer for Inuvik than Yellowknife based on a longer start-up time (i.e. an additional 6 months) and the addition of the IMS Technician training (6 months).

### 6.3.4 Potential to Build Capacity

This option has a high potential to build community capacity. It is assumed that the capacity to fill the two required positions probably does not currently exist within the Inuvik IT community (so new capacity would have to be built). Additionally, there would likely be more efficiency than Option 3, since one office would be set up to house both positions. However, there may be political ramifications if one group is seen to be favored over another.

### 6.3.5 Information Access

The Scope of Work stated the requirement to address the “ability to provide information to users without internet access and meet the communications needs of communities”. The IMS will be an internet-based system. A static version of the IMS metadatabase will be published on suitable removable media, such as a Zip disk or CD-ROM on a quarterly basis. A hardcopy version will not be produced.

### 6.3.6 Ability to Provide Territorial-level Information

As with all options presented, this ability will be limited by the metadata provided by the nodes.

### 6.3.7 Roles, Responsibilities, Support Structure and Service Expectations

As mentioned above. It should be noted that the hub is a separate entity from the Working Group and the Responsible Authority, and that the Hub's responsibilities are limited to performing the four functions stated earlier.

## 6.4 Option 3: Split Hub

### 6.4.1 Description

The four hub functions are split between two organizations, one in Yellowknife (see Section 4.2.1.1), and one in Inuvik (see Section 4.2.1.1) The IMS Manager would be an employee of one of the Government of Canada departments or territorial environmental boards (see section 4.2.1.2), while the IMS Technician would be an employee of one of the co-management boards (see section 4.2.1.2). This model provides moderate potential for capacity building, but requires more time and resources than Option 1.

The two positions are created and filled during implementation. The database and web site design could be either completed in house (over a period of approximately 6 months) or contracted out at a cost of between \$50,000 - \$75,000. Web hosting could be provided in house or contracted out at a minimal cost.

### 6.4.2 Cost of Development and Implementation

IMS Manager:	\$70,000/year
IMS Technician:	\$60,000/year
Office support:	\$40,000-\$50,000/year (depending on location)

It is assumed the costs for staff and office support are slightly higher in Inuvik than for Yellowknife. Costs are based on the research and best estimates of the Project Team members, as well as with comparisons of costs associated with the development of other Hub models considered by the survey (see Section 4.1.4).

**Note:** this cost does not include the costs associated with database and website design (which could be either completed in house over a period of approximately 6 months) or contracted out (at a cost of between \$50,000 - \$75,000.) The 6-months or \$50,000-\$75,000 would have to be added to the cost depending on the route taken.

### 6.4.3 Time for Implementation

Staff hiring and start-up:	6 months – 1 year
IMS Technician training:	6 months (concurrent)
Database and web design:	6 months - 1 year (concurrent)

Initial compilation of metadata: 1 year  
Total time: 2.0 years

Time for implementation is based on best estimates of the Project Team members, as well as with comparisons of timelines associated with the development of other Hub models considered by the survey (see Section 4.1.4). It is assumed that the time for implementation is slightly longer for this Option (compared to Option #1) based on either a longer start-up time (i.e. up to 6 months) or the addition of the IMS Technician training (6 months).

#### **6.4.4 Potential to Build Capacity**

This option has a moderate potential to build community capacity, since it requires training and skills development for the IMS Technician position (located in Inuvik). It is assumed that the capacity to fill the required position probably does not currently exist within the Inuvik IT community (so new capacity would have to be built). Additionally, one potential advantage is the required cooperation between regional groups at the hub level, which would enhance awareness and buy-in in the region and perhaps in other regions.

#### **6.4.5 Information Access**

The Scope of Work stated the requirement to address the “ability to provide information to users without internet access and meet the communications needs of communities”. The IMS will be an internet-based system. A static version of the IMS metadatabase will be published on suitable removable media, such as a Zip disk or CD-ROM on a quarterly basis. A hardcopy version will not be produced.

#### **6.4.6 Ability to Provide Territorial-level Information**

As with all options presented, this ability will be limited by the metadata provided by the nodes.

#### **6.4.7 Roles, Responsibilities, Support Structure and Service Expectations**

As mentioned above. It should be noted that the hub is a separate entity from the Working Group and the Responsible Authority, and that the hub’s responsibilities are limited to performing the four functions stated earlier.

### **6.5 Analysis of the Three Options**

The SOW outlined that the analysis of the options was to be conducted along the following 6 criteria:

- cost of development and implementation
- time for implementation;
- potential to build community capacity;

- ability to provide information to users without Internet access and meet the communications needs of communities;
- ability to provide territorial-level information; and
- roles, responsibilities, support structure and service expectations for the territorial hub.

All three options were identical in their provision of the last three criteria (so additional extensive analysis is not provided here). The options did differ along the first three criteria (and those differences are reported next).

### **6.5.1 Cost of Development and Implementation**

Option 1 (Centralized Hub) is the least expensive of the three options – with total development and implementation costs of between \$300,000 - \$325,000.

Option 2 (Regional Hub) is the most expensive of the three options - with total development and implementation costs of between \$500,000 - \$525,000.

Option 3 (Split Hub) is in between Option 1 and Option 2 in terms of cost - with total development and implementation costs of between \$400,000 - \$450,000.

All total cost estimates were obtained by adding the salaries of the 2 positions and office support, multiplying that by the total time expected, then adding in the database and website design costs (i.e., all total cost estimates assume the contracting out of development).

### **6.5.2 Time For Implementation**

Option 1 (Centralized Hub) would take the least amount of time to implement (approximately 1.5 years).

Option 2 (Regional Hub) would take the longest amount of time to implement (approximately 2.5 years).

Option 3 (Split Hub) would take longer than Option 1 but less time than Option 2 (approximately 2.0 years).

### **6.5.3 Potential to Build Community Capacity**

Option 2 provides for the highest amount of community capacity building.

Option 1 provides for the lowest amount of community capacity building.

Option 3 provides for more community capacity building than Option 1, but less than Option 2.

### 6.5.4 Summary

Table 6.5.4 shows a summary of the analysis of the three options along the cost/time/capacity building criteria.

**Table 6.5.4: Summary of Options**

<b>Option</b>	<b>Cost</b>	<b>Time</b>	<b>Capacity Building</b>
Option 1: Centralized Hub	\$300,000 - \$325,000	1.5 Years	Low
Option 2: Regional Hub	\$500,000 - \$525,000	2.5 Years	High
Option 3: Split Hub	\$400,000 - \$450,000	2.0 Years	Medium

### 6.6 The Preferred Option

The preferred option – based on cost, time and technical capacity (i.e. infrastructure) – is Option 1 (Centralized Hub - Yellowknife).

However, a strong argument can be made for both Option 2 (Regional Hub – Inuvik) and Option 3 (Split Hub – Yellowknife/Inuvik) based on the goal of building community capacity.